General Science Class 7

Unit#1 Plant System

1) Vascular bundle is in centre of roots.
2) Epidermis is the outer layer of roots.
3) Cortex is present in between epidermis and vascular bundle.
4) There are many tiny root hair on epidermis.
5) There are two main types of roots: tap roots and fibrous roots.
6) Taproots are found in many plants, trees & shrubs.
7) Fibrous roots are found in grasses and wheat.
8) Aerial roots grow on parts of plant above the ground, for example in Banyan tree.
9) Plants have two main Systems. Root & Shoot.
10) Shoot system consists of stem, leaves, flowers, fruits.
11) In stems, vascular bundle is arranged just beneath the epidermis.
12) Stems have two types: herbaceous and woody
13) Dasies, grass and cereals have herbaceous stems.
14) Trees and Shrubs have woody stems.
15) In centre of stem, pith is present for storage.
16) Leaf has two parts: leaf blade and leaf stalk.
17) The process of photosynthesis takes place in the mesophyll of leaves.
18) The outermost layer of a leaf is epidermis.
19) In leaves, there is a water proof covering over epidermis called cuticle.
20) Xylem is a dead tissue that transports water and dissolved minerals from roots to the upper parts of plants.

21) Xylem have thick and strong walls.
22) Xylem forms wood and year rings annually.
23) Phloem transports food from leaves to all other parts of plant.
24) Xylem movement is only upwards while the phloem movement can go up & down.
25) Loss of water from aerial parts eg leaves is transpiration.
26) To show transpiration from leaves, cobalt chloride paper is used.
27) Chlorophyll is a green pigment inside chloroplast.
28) Plants need nitrates to make proteins.
29) Plants need magnesium to make chlorophyll.
30) Compost is a fertilizer made from rotting plants.
31) The protective layer around plant parts is called epidermis.
32) Transpiration rate (mm/min) in different conditions.
- Darkness (1)
- Bright light (17)
- Still air (9)
- Moving air (21)
- Dry air (11)
- Moist air (5)
- Warm air (16)
- Cold air (6)
- Dry soil (2)
- Moist soil (18)

Unit#2 Human Respiratory & Circulatory System

1) The waste products of aerobic respiration are CO_2 and H_2O.
2) Waste products of anaerobic respiration are lactic acid or alcohol + CO_2.
3) Air passes from larynx onward to trachea.

4) Oxygen exchange between alveoli and blood in capillaries occurs by diffusion.

5) If all alveoli of a pair of lungs are flattened, Their total surface area would be equal to that of a tennis court.

6) Breathing is a physical process. at organism level.

7) Lungs are spongy and non muscular and cannot move on their own.

8) Blood has two components: plasma & cells.

9) Plasma is a pale yellow coloured liquid that carries water, nutrients, gases, wastes and chemicals (hormones/ions) across body.

10) Plasma is 55% of the blood.

11) Blood cells are 45% of blood. Red Blood cells make 44%. Platelets & WBC make 1%.

12) RBCs are disc shaped with a depression on each side. It also contains haemoglobin.

13) Deficiency of RBCs or haemoglobin causes anaemia.

14) Platelets are irregular shaped, small pieces of cell.

15) Dengue fever virus reduces numbers of platelets.

16) WBCs are of different types, sizes & shapes.

17) AIDS virus attacks WBCs.

18) Blood vessels make a closed circulatory system.

19) Arteries carry blood away from the ~~body~~ heart.

20) Arteries have thick muscular walls.

21) Pulmonary artery carries oxygen poor blood.

22) Arteries branch off into tiny vessels of one cell thick called capillaries.

23) Stretching & thumping back of arteries causes pulse.
24) Veins have thinner walls.
25) Veins have valves.
26) Pulmonary vein carries oxygen rich blood.
27) Small arteries are called arterioles.
28) Small veins are called venules.
29) Blood samples are taken from veins.
30) The heart is divided into two sides and each side has two parts.
31) Upper parts of heart are blood receiving and called atrium.
32) Lower parts of heart are blood distributing and called ventricle.
33) Ventricles are larger and thick walled Than atria.
34) Right atrium recives oxygen poor blood through Vena Cava. and sends to right ventricle.
35) Right ventricle sends oxygen poor blood to lungs through pulmonary artery.
36) Left atrium receives oxygen rich blood from pulmonary vein. and sends to left ventricle.
37) Left ventricle distributes oxygen rich blood through aorta.
38) Heart beats almost 42 million times in one year.
39) An individual has almost 5 litres of blood in body.
40) Exchange of substances between blood and body takes place at the capillaries.
41) Valves keep blood flow uni directional and are found in heart and veins.

42) Oxygen in inhaled air is 21% and in exhaled air is 16%.

43) CO_2 in inhaled air is 0.04% and exhaled air is 4%.

Unit#3 Immunity and Diseases

1) There are three types of immunity:
- innate
- adaptive
- passive

2) Innate immunity is nonspecific and natural defence of body. It has two components.

3) First line of defence includes skin and mucus membranes of mouth, nose, lungs etc

4) Second line of defence includes some WBCs, chemicals and fever.

5) Neutrophils and macrophages are WBCs of second line of defence.

6) Adaptive immunity is also learned immunity. It includes third line of defence.

7) Third line of defence identifies the germ and starts making special T cells & B cells.

8) B cells attack invaders outside the cell.

9) T cells attack invaders inside the cell.

10) T cells directly kills the virus infected cells.

11) B cells make antibodies.

12) Antibodies are special proteins flowing in blood and recognize and kill virus and bacteria.

13) B and T cells form memory cells.

14) There are two ways to trigger antibody formation:
- get diseased or
- get vaccinated.

15) Polio vaccines are given in form of oral drops.

16) Covid-19 vaccines are injected.

17) Already prepared antibodies external to body are short-lived and called passive immunity.

18) Maternal or natural passive immunity is done in two ways.

- passing of antibodies through the placenta from mother to child before its birth.
- passing of antibodies through breast milk.

19) Infectious diseases commonly spread through the direct transfer of pathogens via:

- The air in form of droplets.
- Faecal-oral spread through food and water
- blood or other body flaids.
- skin or mucus membrane as result of direct contact.

20) Dengue fever is caused by dengue virus but spreads through bites of Aedes mosquitos.

21) Hepatitis-B is caused by hepatitis B virus but is spread through blood, body fluids, multiple use and shoring of bodily instruments.

22) Typhoid spreads through faecal oral route.

23) Some bacteria cause disease by making a harmful protein called toxin.

24) A new born baby only has ~~natural~~ innate and natural passive imunity.

Unit#4 Physical and Chemical Changes

1) Antonie Lavoisier in considered as the father of Chemistry.

2) Antonie Lavoisier discovered law of conservation of mass.

3) Incomplete combustion of fuel produces Carbon monoxide which is highly poisonous.

4) Complete combustion of fuel produces:
- unburnt carbon particles which causes asthma.
- carbon dioxide which causes global warming.
- sulphur dioxide which causes acid rain.

5) The process of applying a coating of another metal that does not get rusted easily is called galvanizing.

6) Silver objects get a black coating in contrast to iron getting a reddish-brown one.

7) Hydrogen Sulphide in air reacts with silver to tarnish it and form black silver sulphide.

8) $4Ag + H_2S + O_2 \longrightarrow 2Ag_2S + 2H_2O$

9) Mass, volume and weight are physical properties which depend upon the amount of substance, while other physical properties do not depend.

10) Ductility is the ability to be drawn into wire – copper.

11) Malleability is the ability to be hammered in a sheet e.g gold.

12) Salt in ice lowers the freezing point.

13) Physical properties can be observed and measured directly.

14) Chemical properties can be observed after the change.

15) Reactivity and flammability are chemical changes.
16) Acetone and diethyl ether are highly flammable.
17) In physical change state may change but the composition remains the same.

Unit# 5 Structure of an Atom

1) Solid sphere model of atom was given by Dalton in 1803.
2) Plum Pudding model was given by J.J. Thompson in 1904.
3) Nuclear model was given by Ernest Rutherford in 1911.
4) Planetary model was given by Neils Bohr in 1913.
5) Quantum model was given by Erwin Schrödinger in 1926.
6) Number of proton or electron is atomic number (Z).
7) Elements in periodic table are arranged in increasing atomic number.
8) Number of protons and neutrons together is mass number (A).
9) Protons and neutrons are also called nucleons.
10) Horizontal rows in periodic table are 'periods'.
11) Elements in a period have same number of shells.
12) In total, there are 7 periods in Periodic Table.
13) Vertical columns in periodic table are 'groups'.
14) There are 18 groups in a Periodic Table.
15) Noble gases have low melting and boiling points.
16) In a periodic table, the atomic number is listed above the symbol and mass number below the symbol.
17) Fixed circular paths of electrons around nucleus are called shells.
18) Hydrogen has 1 p, 1 e, and no neutron.
19) Lithium has 3 p, 3 e, and 4 n.
20) Boron has 5 p, 5 e, and 6 n.

21) Oxygen has 8 p, 8 e and 8 n.
22) Chlorine has 17 p, 17 e and 18 n.
23) Nitrogen has 7 p, 7 e and 7 n.

Unit#6 Chemical Bonds

1) The combining capacity of the atom to form a chemical bond is called valency.

2) Valency means number of electrons that an atom can gain, lose or share · to form a compound.

3) Valency of various groups is :

GI	GII	GIII	GIV	GV	GVI	GVII	GVIII
1	2	3	4	3	2	1	0

4) Groups I, II, III lose electrons.

5) Group IV shares electrons

6) Groups V, VI, VII gain or share electrons.

7) After losing electrons, atoms become positive cations.

8) After gaining electrons, atoms become negative anion.

9) Chemical formula is a symbolic representation that shows • types of atoms • number of atoms of each type.

10) Chemical formula is determined by using valency of atoms.

11) Valence electrons are involved in chemical bonding.

12) When atoms come close to each other, both attractive and repulsive forces increase at the same time as the distance between atoms decrease.

13) In chemical bonding, there is an electrostatic attraction between the nuclei and the valence electrons.

14) During bond formation, metals tend to lose electrons

15) Electrostatic attraction occurs between two ions of opposite charges in a bond.

Unit#7 Solutions

1) A homogenous mixture of 2 or more substances is known as solution.
2) Tincture of iodine is an antiseptic. It is made up of iodine dissolved in alcohol.
3) Air consists of O, CO_2 and other gases dissolved in N.
4) A fizzy drink is made up of CO_2 and sugar dissolved in H_2O.
5) Gold jewellery is an alloy of 80% gold and 20% silver and some other metals.
6) In vinegar, acetic acid is dissolved in water.
7) Turpentine is used as a solvent in production of paints, inks and dyes.
8) Water is used as solvent in making soaps & detergents.
9) Alloys are solid solutions.
10) Smoke is a solution of smoke particles dissolved in air.
11) Different types of solutions with examples are:

• gas in gas	gases dissolved in Nitrogen in air
• gas in liquid	O_2 dissolved in H_2O
• gas in solid	hydrogen dissolved in Palladium
• liquid in gas	water dissolved in air / humid air
• liquid in liquid	ethanol dissolved in H_2O (alcohol)
• liquid in solid	mercury dissolved in silver (dental fillings)
• solid in gas	Smoke

• Solid in liquid	Salt or sugar dissolved in H_2O
○ solid in solid	metal alloys.

12) Bronze is alloy of tin dissolved in Copper.
13) Brass is alloy of zinc dissolved in copper.
14) Ketchup, cola, Citric juice, solution of vinegar and salt are used to clean tarnished copper coins.
15) Cola or carbonated drinks have phosphoric acid.
16) Unsaturated solutions have ability to solve more solute but saturated solutions do not.
17) Maximum of 36g of NaCl can dissolve in 100 ml H_2O.
18) Saline is NaCl in H_2O. It is an example of medical solutions used for treating dehydration.
19) Solubility of a solute depends upon 3 factors.
    - nature of both solute & solvent.
    - temperature
    - pressure
20) Liquids and solids solubility in water becomes higher at higher temperature.
21) When temperature of a supersaturated solution is lowered, it forms crystals throug cristalization.
22) Rock candy is made through the process of crystallisation.
23) Solubility of gases in water decreases with increase in temperature.
24) Solubility of gases increase with increase in pressure. But it hardly affects solubility of liquids & solids.
25) Acetone is a liquid solvent that can break down and dissolve other substances.

26) Acetone is used in nail polish remover, paint remover and varnish remover.

27) Acetone is used in manufacturing plastics, lacquers, textiles.

28) Solubility is related to amount being dissolved. While Dissolving is about disappearing of substance.

29) Dissolving of solute can be accelerated by increasing temperature of solvent, stirring up the solvent, grinding the solute particles.

30) Oil, chalk and sand are water insoluble.

Unit#8 Force and Motion

1) Average speed of cheetah is 112 km/h.

2) Saharan Silver Ant is the fastest ant with average speed 3.1 km/h.

3) A space rocket can hit speed of 40,000 km/h

4) Conference on weight and measures was held in Paris in 1960.

5) Conversion of $1\,\frac{km}{h} = 1\times\frac{5}{18}$ m/s.

6) Conversion of $1\,\frac{m}{s} = 1\times\frac{18}{5}$ km/h

7) Speedometer of a car measures its instanteous speed.

8) Odometer measures the distance covered by a car.

9) Graph is used to represent relation between two or more quantities in form of diagrams.

10) For graph of speed, distance is taken along y-axis and time on x-axis.

11) If a body of 1 km changes speed at rate of 1 m/s, the force is 1N.

12) Examples of contact force are: Surface tension of liquid, air resistance, friction, upthrust of liquids, air drag force, normal reaction force, muscular forces

13) Examples of non-contact force are: gravitational forces weight of a body, magnetic force, electrostatic force.

14) Average speed of a snail is 0.00758 mph.

15) Average speed of an elephant is 20 mph.

16) A straight line on time axis of graph means speed is zero.

Unit #9 Waves and Energy

1) Waves carry energy from one place to another but do not transfer matter.

2) Waves which require a medium to travel are called Mechanical waves.

3) Examples of mechanical waves include: sound waves, water waves, seismic waves.

4) Waves which can travel within or without any medium are called electromagnetic waves.

5) Light waves, x-rays etc are examples of electromagnetic waves.

6) Light and heat travels in form of electromagnetic waves.

7) Such waves in which particles of the medium vibrate perpendicular to direction of wave are transverse waves.

8) Examples of transverse waves include string waves, water waves on surface, slinky spring if disturbed perpendicular to its length.

9) Transverse waves can be both mechanical as well as electromagnetic.

10) All electromagnetic waves are only transverse.

11) Those waves in which particles of medium vibrate parallel to direction of wave are called longitudinal waves.

12) Transverse waves are in form of crest & trough.

13) Longitudinal waves are in form of compression and rarefaction.

14) Variation in density of medium is due to the variation of pressure on its particles in longitudinal waves.

15) Examples of longitudinal waves include Sound waves, primary waves of earthquake, tsunami waves, slinky spring disturbed along its length.

16) All longitudinal waves are mechanical.

17) Longitudinal waves move faster through Earth than transverse waves.

18) Longitudinal waves of earthquake reach the seismographs first hence called Primary or P-waves.

19) Transverve waves of earthquake reach the seismographs late hence secondary or S-waves.

20) Formula of Time Period = total time / no of waves

21) Amplitude is maximum displacement of vibrating particles of the medium from mean position when a wave is passing through it.

22) Amplitude of a wave is measure of energy it carries.

23) Waves of shorter wavelength (more cycles) pass through a point in small time with higher frequency and vice versa.

24) Waves of high frequency and large amplitude are most energetic.

25) Loudness of sound depends upon amplitude of sound wave but does not depend upon its frequency.

26) Shrill sound has greater frequency and higher pitch eg children and females.

27) Grave sound has lower frequency and lower pitch.

28) Pitch of sound is directly proportional to frequency.

29) Loudness of sound depends upon various factors:

- amplitude of wave
- surface area of sound source
- distance from sound source
- sensitivity of ear.

30) Loudness of sound is directly proportional to amplitude.

31) Loudness of sound is directly proportional to surface area of the sound source.

32) Loudness of sound is inversely proportional to the distance between observer and the sound source.

33) Older people usually can not listen to soft sounds.

34) The feeling of the original sound remains in our brain for 0·1 seconds.

35) To hear two distinct sounds or an echo, the time gap between original sound and reflected sound or echo should be at least 0·1 seconds.

36) To hear an echo, the minimum distance in air between speaker and reflecting surface should be at least 17 m.

37) At room temperature, speed of sound in air is 340 m/s.

38) Speed of sound at 0°C is 332 m/s.

39) Dog has low pitch; cats, birds have high pitch.

40) If frequency is doubled but amplitude is kept same then loudness remains same and pitch increases

Unit#10 Heat and Temperature

1) The total kinetic energy and potential energy of all the particles in a substance is called thermal energy.

2) Temperature a laboratory is kept 320K.

3) S.I unit of temperature is kelvin(K).

4) Kelvin is used for scientific calculations, fahrenheit is used for clinical purposes, centigrade is used for normal daily life temperatures eg. weather.

5) Temperature is independent of the mass of object.

6) For a temperature scale Freezing point of water is taken as lower reference point and boiling point of water as upper reference point.

7) Absolute zero, water freezing point, water boiling point, human body temperature and number of divisions on various scales are given below.

	K	°C	°F
Absolute zero	0	-273	-459
Water Freezing temperatur	273	0	32
Water Boiling temperature	373	100	212
Human Body temperature	310	37°	98.6
Number of divisions	100	100	180

8) A change of one degree centigrade is same as change of one kelvin.

9) James Prescott Joule was an English physicist and mathematician.

6) Unlike temperature, heat is dependent upon the mass of object. $Q = mc\Delta t$.

7) Usually, gases expand more than liquids and liquids expand more than solids.

8) In solids, particles only vibrate about their mean position, while in fluids such as liquids and gases, the particles freely Flow.

9) Conduction is the method of transfer of heat from hot part of body to cold part of itself or other touching body by vibration of particles.

10) Conduction occurs in solids. mostly.

11) A transfer of heat by actual movement of molecules from hot to cold place is known as convection.

12) In convection heat currents are generated which move upwards.

13) Convection occurs in liquids an gases only.

14) Upward movement of air due to convection is called thermals.

15) Eagles, hawks and vultures are thermal climbers.

16) Transfer of heat in form of electromagnetic waves is called radiation.

17) Radiations do not need any medium for the transfer of heat.

18) Infra-red radiation carries most amount of heat energy.

19) Blowing of winds especially near sea areas is due to convection.

20) During day, warm air blows from land to sea and cool air from sea to land and vice versa at night.

21) Mercury in thermometer uses thermal expansion.
22) Fur, wool and saw dust trap air and act as insulators.
23) The heat transfer that occurs due to a density difference in fluids is convection.
24) Among wood, wool and air, the worst conductor is air.

Unit#11 Technology in Everyday life

1) World has 70% water but 30% land.
2) This water is 98% salt and 2% fresh.
3) Fresh water is 87% ice, 12% ground and 1% rivers and lakes.
4) The number of people who do not have direct access to drinking water is 2.1 billion.
5) The percentage of natural disasters caused by water is 90%.
6) 70% of world's available water is consumed in agriculture each year.
7) 48%. dams around the world are used for irrigation.
8) The number of people whose drinking water is provided by desalination plants is 300 million.
9) Drip irrigation can reduce water use by 30 to 70 % as compared to conventional sprinkler.
10) Freezing of food is done to at least -18 °C.
11) Yoghurt is fermented from milk.
12) Sauerkraut is fermented from cabbage
13) In pickling, the food is soaked in a solution containing salt and acid

14) Acid in pickling can be vinegar and lemon juice

15) In early 20th century, dry salting was used as alternative to canning.

16) Canning involves pasteurising and then vacaum sealing of food in special glass jars.

17) Pasteurization means heating food at a specified temperature for a certain time to kill microbes.

18) Technique of pasteurization was discovered by Louis Pasteur, a French chemist and microbiologist.

19) In curing, salt, acid and nitrates are used to treat meat and fish.

20) Stethoscope is used to listen to heartbeats.

21) To make hand sanitizer, we require:

- 2/3 cup of rubbing alcohol e.g ethanol
- 1/3 cup of aloe vera gel
- 5-10 drops of Mustard oil e.g essential oil.

22) Pickling is best way to preserve vegetables.

23) Opthalmoscope is used to examine inside of an eye e.g retina and optic nerve.

24) The process of food preservation in which useful bacteria is allowed to grow against the harmful bacteria is called fermentation.

25) Drip irrigation is useful because it reaches the root directly and reduces water loss.

26) Sprinklers are used to spread water equally

Unit # 12 Earth and Space

1) Gravitational pull of the sun does not let the planets to travel straight in direction of speed. Instead planets are forced to move in orbits of gravity.

2) 1 Ton equals to 1000 kg of mass

3) 1 g equals to 1000 mg of mass

4) Mass of a body is measured by physical balance.

5) Weight of a body is measured by Spring Balance or Force Meter.

6) Mass of moon is 6 times less than the mass of Earth so value of (g) on moon is $\frac{10}{6} = 1.6$ N/Kg

7) Units of (g) are : N/Kg and m/s^2.

8) Causes of tides on ocean are:
- gravitational pull of moon.
- gravitational pull of Earth.
- gravitational pull of spinning of Earth.

9) The gravitational attraction of moon has a major impact on ocean water.

10) On Earth there are two high tides : the side of earth directly facing the ~~Ear~~ Moon and the side of Earth farthest from the moon.

11) The side of Earth directly facing the Moon gets high tides due to Moon's Gravitational pull on Earth.

12) High tides of side of Earth farthest from moon is due to inertia.

13) Spinning of Earth on its axis is tilted to 23.5° and causes day and night.

14) Revolution of Earth around Sun causes change in seasons.

15) Equator is at 0° latitude.

26) "Perpendicular to orbit plane" is an imaginary line at 90° to the ~~pto~~ equator/orbit plane.

17) Axis is the line around which planets spin.

18) Axial tilt is defined as the angle between the "direction of the north pole" and the "perpendicular to the orbit plane".

19) If the tilted angle is zero, There would be no seasons. because it is the tilted axis that causes the seasons.

20) When the axis of Earth is towards the sun, there is summer for that part of Earth.

21) If the axis of Earth is away from the sun, There is winter for that part of Earth.

22) In between these two times, there is Spring and Autumn.

23) Constellations shift gradually to the west.

24) Shifting of constellations is caused by motion of Earth around Sun at an axial tilt.

25) When the tilted axis of the Earth is towards the sun, then Northern hemisphere receives most of direct sun rays. It will be summer in the northern hemisphere and winter on southern hemisphere.

26) When the tilted axis is away from the Sun, the Southern hemisphere receives the maximum direct sunlight. It will be summer in Southern hemisphere and winter in Northern hemisphere.

27) When the tilted axis is towards the sun, the northpole is ~~facing the~~ tilted towards the sun.

28) When the tilted axis is away from the sun, the southpole is tilted towards the sun.

29) In between summer and winter, it is fall.

30) In between winter and summer, it is spring.

31) Winter solstice is on 22 Dec.

32) During winter solstice, there is winter in northern hemisphere but summer in southern hemisphere.

33) Vernal Equinox is on 21 March.

34) During vernal equinox, there is spring in northern hemisphere but autumn in the southern hemisphere.

35) Summer solstice is on 21 June.

36) During summer solstice, there is summer in northern hemisphere but winter in southern hemisphere.

37) Autumnal equinox is on 23 Sep.

38) During autumnal equinox, there is fall in northern hemisphere but spring in southern hemisphere.

Unit #1 Ecology

Class 8 General Science

1) The study of interrelationship between organisms and their environment is called ecology.
2) Earth atmosphere has 21% molecular oxygen.
3) Carbon in Earth atmosphere is in form of CO_2.
4) The global temperature of Earth has increased about 1% in last 100 years.
5) CO_2 is a leading greenhouse gas.
6) Pitcher plant and Venus fly trap are carnivorous plants that prey upon insects and other small animals to fulfill their nitrogen defiency.
7) Parasitism is a symbiotic relationship in which one member harms the other to benefit itself.
8) Mosquito, liver fluke, leech are examples of parasitism.
9) In mutualism, both members get benefit.
10) In commensalism, one partner gets benefit without any benefit or harm done to the others. e.g epiphytes.
11) Herbivores are primary consumers feeding on plants.
12) Carnivores are secondary and tertiary consumers.
13) Fungi and bacteria are examples of decomposers.
14) A food chain is a series of organisms through which energy is transfered in form of food.
15) Many food chains are connected in a food web.
16) More and more energy is lost as we go down a food chain.
17) The total energy is highest at the producer level and lowest at last level.
18) Afforestation is plantation of forest on land where there was no forest before.

19) Rhizobium and plant roots show mutualism.
20) In an ecosystem, energy flow is unidirectional.
21) The most common non-biodegradable pollutant is plastic bag.

Unit#2 Human Nervous System.

1) Dendrites are fibres of neuron which transmit nerve impulses to the cell body.
2) Axon is the neuron fibre which transmits nerve impulse away from the cell body.
3) Interneurons are neurons of central nervous system.
4) Effector can be a muscle, gland or organ.
5) Forebrain consists of cerebrum, thalamus and hypothalamus.
6) Thalamus plays critical role in the processing of perception.
7) Thalamus receives sensory information from receptors and sends them to the specific part of cerebrum.
8) Hypothalamus regulates body temperature, appetite, water balance and blood pressure.
9) Hypothalamus controls moods and emotions e.g anger, fear.
10) In humans, midbrain is in reduced form.
11) Reflex movements of eye muscles are controlled by midbrain.
12) Hindbrain consists of cerebellum, pons, medulla oblongata.
13) Cerebellum controls precision of all movements including voluntary muscles.
14) Pons is a bridge between cerebellum and other parts of the brain.

15) Medulla Oblongata controls involuntary activities like heart rate, breathing rate, swallowing, vomiting, salivation, coughing and sneezing.

16) Brain stem is the posterior part of brain.

17) Brain stem consists of 3 parts: midbrain, pons and medulla oblongata.

18) Heart rate, breathing, blood pressure ~~etc~~ are regulated by brainstem.

19) In brain, white matter is in the centre while grey matter is in outerside.

20) In spinal cord, grey matter is in the centre in butterfly shape and white matter is outside.

21) Grey matter has cell bodies of neuron and non-myelinated fibres.

22) White matter has myelinated fibres.

23) A nerve contains many fibres of sensory neurons, motor neurons or both protected in a sheath of connective tissue.

24) Nerves may be cranial or spinal.

25) There are 12 pairs of cranial nerves originating from brain.

26) There are 31 pairs of spinal nerves originating from spinal cord.

Unit#3 Variations, Heredity and Cell Division

1) Passing of traits to next generation is called heredity.

2) Some variations have very few distinct forms and are called discontinuous variation.

3) Examples of discontinuous variation are free or attached ear lobes and blood groups.

4) The variations which have a wide range of types from one extreme to other is called Continuous variation.

5) Human height and skin colour are examples of continuous variations.

6) There are two types of adaptation: structural and behavioural.

7) Plants shedding leaves in winter and seasonal migration are examples of behavioural adaptations.

8) Protein fold and pack DNA in the chromosomes.

9) Nicleotides consist of:

- 5-carbon sugar called deoxyribose
- phosphate group
- Nitrogen bases

10) There are four types of nucleotides depending on four types of nitrogenous bases.

11) Life of all sexually produced organisms start from a single cell called zygote.

12) Extra copy of entire DNA is made before mitosis.

13) In prophase, each chromosome chromatids attached at centromere become visible.

14) Nuclear membrane disappears and spindle fibre begin to form during prophase.

15) In metaphase, chromosomes alligned in centre and spindle fibre attaches to their centromere.

16) In Anaphase, centromere splits and chromatids are pulled to opposite poles of cell.

17) In telophase, chromosomes uncoil and nuclear membrane reappears

18) Cytokinesis is the division of cytoplasm.

19) Meiosis occurs in gametes i.e eggs and sperms.

20) Meiosis is a reduction division.

21) In Meiosis I, identical chromosomes pair with each other which are later separated. Crossing over happens during this process.

22) Meosis II is similar to Mitosis.

23) Tongue rolling is discontinuous variation.

24) Intelligence is continuous variation.

25) The pairing of chromosomes occurs during Prophas I of meosis.

26) Number of chromosomes in different species:

• human=46 • chimpanzee=48 • dog=78 • cat=38
• horse=64 • donkey=62 • cow=60 • buffalo=50
• sheep=54 • goat=60 • pig=38 • rabbit=44
• rat=42 • mouse=40 • onion=16 • rice=24
• maize/corn=20 • wheat=42 • tobacco=48 • pea=14

Unit#4 Biotechnology

1) Biotechnology approaches have targetted at increasing iron content in rice.

2) Biofortification of wheat includes new varieties of wheat with higher iron and zinc content.

3) Golden rice is produced to be grown and used in areas with a shortage of dietary vitamin A.

4) A genetically modified sheep produces human clotting factor in her milk, which helps persons suffering from haemophilia.

5) Fermentation means chemical conversion of an organic compound by means of enzymes etc.

6) Fermented food from different products are:
- yoghurt, cheese and kefir from milk.
- vinegar and cider from fruits.
- pickles and kimchi from vegetables.
- soya sauce from legumes.
- sausage, pepperoni, salami from meat.

7) Prebiotics are products (tomato, onion, garlic, beans) that helps in growth of probiotics.

8) Probiotics are made up of good bacteria.

9) Probiotics are found in fermented foods.

10) The enzyme amylase affects the texture and freshness of bread dough.

11) GMO yoghurt is produced by GM lactic acid bacteria.

12) Chymosin or renin is an enzyme which is used as clotting agent in GMO cheese.

13) Traditionally, chymosin was obtained from the 4th stomach lining of young calves.

14) Insulin is a harmone deficient in patients of diabetes.

15) Traditionally, insulin was obtained from the blood of slaughtered animals.

16) In 1982, a human version of insulin became available to control blood glucose level. This was producing by inserting insulin gene in a bacteria.

17) First commercialized biotechnology medicine is insulin.

18) Thymosin and human growth hormones are also produced using this technique.

19) Thymosin is useful in treating brain cancer.

20) Biotechnology methods are used to produce vaccines for Hepatitis B and COVID-19.

21) To avoid toxic chemicals, microorganisms are now being used to produce textile dyes.

22) Biodegradable plastics are ~~developed~~ decomposed by bacteria and fungi.

23) Ethanol can be used as a biofuel.

24) Baking process uses enzymes from yeast

25) In 1796, Edward Jenner inoculated a boy with cowpox virus which is considered the first ever vaccination in human history.

26) Cowpox material developed immunity in that boy against small pox.

Unit#5 The Periodic Table

1) Element nobelium (at. no 102) was discovered by Alfred Nobel.

2) Atomic number was discovered by Moseley in 1913.

3) The period number shows the number of electronic shells in an element.

4) Number of elements in a period can range from 2-32.
- Period 1 = 2
- Period 2 = 8
- Period 3 = 8
- Period 4 = 18
- Period 5 = 18
- Period 6 = 32
- Period 7 = 32

5) Elements in one period have same number of electronic shells.

6) Elements in one group have same number of electrons in valence shell.

7) All elements are classiefied into two main groups: Group A (8 groups) Group B (10 groups).

8) There are total 18 groups in Periodic table.

9) Group A contains Alkali, Alkaline Earth metals, Metals, metalloid, non-metals, halogens, noble gases.

10) Group B elements are called transition elements, consisting of transition metals, lanthanide, actinide.

11) Alkali metals are very reactive with air and moisture, so they are kept in oil.

12) Early chemists gave the name 'earths' to alkaline earth metals.

13) Based on properties, elements can be classified into 3 categories:
- metals
- non-metals
- metalloids.

14) Metals appear on the left side and nonmetals appear on the right side of periodic table.

15) Metalloids are: Boron, Silicon, Germanium, Arsenic, Antimony, tellerium, pollanium.

16) Density of copper is 8.96 g/cm^3.

17) Metals are mixed with other metals or non-mentals (eg carbon) to make them stronger and harder.

18) Steel is an alloy of iron containing small amounts of carbon and other metals.

19) Silver and copper are mixed with gold to produce different coloured shades in jewellery.

20) Aluminium is malleable, light and strong metal.

21) Aluminium is used to make bicycle frames & rims.

22) Alloys of aluminium with magnesium and zirconium can withstand high temperatures. These are highly corrosion resistant. These are used to make aeroplanes, solar panels and other aerospace technologies.

Unit#6 Chemical Reaction and Bonding

1) Iron oxide in apple is yellow brown.

2) When a match stick is burnt, it gives CO_2, H_2O, ash.

3) Chemical action of bacteria converts butter fat into butyric acid, which has bad taste and colour.

4) When coal is burnt in air, CO_2 is produced.

5) A combustion reaction with flames is called burning.

6) There are five types of chemical reactions.

7) During electrical discharges in the atmosphere, nitrogen combines with oxygen to produce nitric oxide.

8) Combination reaction is also known as synthesis or addition reaction.

9) Addition of hydrogen to vegetable oil in the presence of a catalyst converts it into vegetable ghee.

10) Pottasium chlorate decomposes into Pottassium chloride and oxygen in the presence of catalyst MnO_2.

11) Upon heating, limestone decomposes into lime.

$$CaCO_3 \xrightarrow{heat} CaO + CO_2.$$

12) Commercially sodium is obtained by passing electricity through molten $NaCl$.

13) Zinc can displace hydrogen from acids.

14) Examples of Displacement reaction are:

- $Zn + H_2SO_4 \rightarrow ZnSO_4 + H_2$
- $2Fe_2O_3 + 3C \rightarrow 4Fe + 3CO_2$.

15) Reaction of acid and base is called neutralization reaction as well as double displacement reaction.

16) Examples of double displacement reaction are:

- $NaOH + HCl \longrightarrow NaCl + H_2O$
- $AgNO_3 + NaCl \longrightarrow AgCl + NaNO_3$.

17) Examples of endothermic reactions are:

- $CH_3COOH + NaHCO_3 \rightarrow CO_2 + H_2O + CH_3COONa$
- $CaCO_3 + heat \longrightarrow CaO + CO_2$
- $2H_2O \xrightarrow{electricity} 2H_2 + O_2$
- $6CO_2 + 6H_2O \xrightarrow{sunlight} C_6H_{12}O_6 + 6O_2$
- $2O_3 \xrightarrow{uv\ light} 3O_2$

18) Examples of exothermic reactions are:

- $CuSO_4 + 2NaOH \longrightarrow Cu(OH)_2 + Na_2SO_4$
- $CH_4 + 2O_2 \longrightarrow CO_2 + 2H_2O + heat + light$
- $2H_2 + O_2 \longrightarrow 2H_2O + heat + light$
- $C + O_2 \longrightarrow CO_2 + heat$

19) Exothermic reaction keeps batteries functioning.

20) When dry citric acid and sodium hydrogen carbonate of sherbet sweets are mixed, an endothermic reaction takes place creating a cool refreshing feeling in mouth.

21) When cake dough is heated, an endothermic reaction takes place.

22) There are two types of bonds: ionic & covalent.

23) Ionic bonds are found in compounds that contain metals combined with non-metals.

24) Different ionic compounds with their uses are:

$NaCl$	ordinary table or common salt
NaF	ingredient in toothpaste
$NaHCO_3$	used as baking soda and antacid
Na_2CO_3	ingredient in cleaning agents
$CaCO_3$	used in making cement, lime, CO_2
$NaOH$	used in making drain clean & soap forming

25) Different covalent compounds with uses are:

H_2O	many uses
$C_6H_{12}O_6$	ingredient in baking, cooking, beverges
CH_3COOH	as preservative & seasoning food and salad
$C_7H_8O_4$ (aspirin)	to treat pain, fever, inflamations.

26) Nitrogen combines with oxygen. This is endothermic reaction.

27) When $CuSO_4$ and $NaOH$ are mixed, the chemical reaction is indicated by blue precipitate of $Cu(OH)_2$.

28) Iodine added to starch changes colour into blue-black.

29) Presence or absence of starch in food is indicated by iodine.

Unit#7 Acids, Bases and Salts

1) The word acid is derived from Latin word 'acidus' meaning sour.
2) Hydrogen ion in acid makes it sour.
3) Examples of mineral acids are:
   - HCl • H_2SO_4 • H_2CO_3 • HNO_3 • H_3PO_4
4) Carbonic acid is formed by dissolving CO_2 in H_2O.
5) Examples of organic acid are:
   - acetic acid (CH_3COOH) • Formic acid($HCOOH$)
   - oxalic acid ($C_2H_2O_4$) • citric acid ($C_6H_8O_7$)
6) Acetic acid is obtained from vinegar.
7) Formic acid is present in bee sting.
8) HCl, H_2SO_4, HNO_3 are strong acids.
9) Vinegar, formic acid, carbonic acid are weak acids.
10) A base that dissolves in water is called alkali.
11) The word alkali is derived from Arabic 'qali' meaning ashes. Alkalies were first found in ashes of plants.
12) $NaOH$, KOH are strong alkalies.
13) NH_4OH, $Cu(OH)_2$ are weak alkalies.
14) Sodium hydroxide is known as caustic soda.
15) Pottasium hydroxide is known as caustic potash.
16) Calcium hydroxide is known as slaked lime.
17) When hydrogen of an acid is replaced with a metal, resulting compound is called a salt.
18) Sodium sulphate is made from sulphuric acid.
19) Normal salts e.g $NaCl$, Na_2SO_4, $CaSO_4$, KCl are made from complete neutralization of acid & base

20) $NaHCO_3$, $NaHSO_4$ are acid salts.

21) $Zn(OH)Cl$, $Pb(OH)Cl$ are basic salts.

22) A Salt that contains two different cations or anions is called double salts. Examples are:
- Dolomite = $CaCO_3 \cdot MgCO_3$
- Alum $K_2SO_4 \cdot Al_2(SO_4)_3 \cdot 24H_2O$

23) Citrus fruits contain citric acid.

24) Apple contains malic acid.

25) Grapes contain tartaric acid.

26) Salts are generally soluble in water. Exception are: $CaCO_3$, $MgCO_3$, $PbSO_4$.

27) Dilute sulphuric acid (30%) is used is lead battery.

28) In idustry, sulphuric acid is used in fertilizers, artificial fibres, paints, dyes and refining of petroleum.

29) Citric acid is used as preservative in sauce & pickles.

30) H_3PO_4 is used in cola drinks & H_2CO_3 is used in fizzy drinks.

31) HNO_3 is used in making fertilizers and explosives.

32) Aspirin contains acetylsalicylic acid ($C_9H_8O_4$)

32) Ascorbic acid ($C_6H_8O_6$) is another name for Vitamin C.

33) NaOH is used as degreasing agent against oil & grease.

34) NaOH is used in soaps, paper pulp, medicine, petroleum refining.

35) $Ca(OH)_2$ is used to make bleaching power & to neutrailize soil acidity.

36) NH_4OH is used in making fertilizers.

37) NaCl is involved in muscle contraction & nerve impulse.

38) In industry, NaCl is used to manufacture chemicals i.e: sodium hydroxide, baking soda, washing soda, soda ash.

39) Calcium carbonate is present in marble & lime stone.

40) Potassium nitrate (KNO_3) is used as fertilizer & making gun powder.

41) Sodium carbonate or washing soda (Na_2CO_3) is used in cleaning, water softening and making glass.

42) Ammanium nitrate (NH_4NO_3) & Ammonium sulphate $(NH_4)_2SO_4$ are used as fertilizers.

43) Litmus turns red in acid & blue in alkali.

44) Methyl Orange turns red in acid & yellow in alkali.

45) Phenolphtalein turns colourless in acid & pink in alkali.

46) Antacid has alkali which neutralizes acid of indigestion.

47) $Mg(OH)_2$ or 'milk of magnesia' is an antacid.

48) When a wasp stings, it injects alkali, so an acid vinegar is rubbed over it.

49) When a bee or ant stings, it injects acid, so an alkali baking soda or $Ca(OH)_2$ is rubbed over it.

50) Power stations emit acids i.e SO_2 and NO_2 so CaO is used to neutralize them.

51) pH paper is known as universal indicator.

52) pH range of litmus is 4.5 to 8.32.

53) Apple, banana, tomato, milk are acidic. ($pH < 7$).

54) Blood, drain cleaner, ammonia are basic. ($pH > 7$).

55) pH of HCl and H_2SO_4 is (0-1). pH of $NaOH$ and KOH is 13-14. pH of sugar & distilled water is 7.

56) A reaction of acid with a carbonate yields a salt, H_2O and CO_2.

U#8 Force and Pressure

1) When net force is zero, all forces acting on a body are balanced and there is no change of state.
2) Net or resultant force is sum of all forces acting.
3) Force acting on a unit area of surface is pressure.
4) Pressure in liquids and gases is determined by flow of mass from high pressure region to low pressure region
5) Pressure in a liquid increases with depth.
6) Pressure at one depth in liquids acts equally in all directions.
7) Pressure depends on density of liquids. More density means more pressure at any given depth.
8) Pressure in gases means force exerted on walls.
9) Atmospheric pressure decreases with height.
10) Atmospheric pressure at 20,000 ft is half of that of sea level.
11) One atm is equal to 101325 pa.
12) Buoyant force acting on an object submerged in a fluid is equal to the weight of the fluid it displaces.
13) Buoyant force arises because pressure increases with depth in a fluid.
14) There is a net upward, or buoyant force on any object in any fluid.
15) If the bouyant force is greater than the object's weight, the object will rise to surface and vice versa.
16) If the object's weight is greater than the weight of the displaced water, it sinks.
17) Steel is almost 8 times denser than water.

18) Hydraulic elevators work on Pascal's principle. It says that if the pressure in a fluid is increased at any point in a container, the pressure increases at all points inside the container by exactly the same amount

19) A football is at rest on ground, the forces on it are balanced and net force is zero.

20) An object is moving in a circle uniformly, the forces acting on it are unbalanced

21) The unit of buoyant force is newton.

22) If a submerged object displaces an amount of liquid with a weight less than its own, it will sink.

Unit#9 Reflection and Refraction of Light

1) The objects appear opaque because of absorption.
2) Sun is about 150 million kms away from earth. Light from Sun reaches Earth in 8 min 20 sec
3) Light reflected from moon takes 1.3 sec to reach Earth.
4) Speed of light is 1 million times greater than that of sound.
5) Direction of path in which light travels is called a ray.
6) First law of reflection states that incident ray, reflected ray, and normal all lie in same plane.
7) Second law of reflection states that angle of reflection is equal to angle of incidence.
8) There are two types of reflection: regular reflection and diffuse reflection.
9) Smooth surfaces reflect light in one direction.

10) Rough surfaces reflect light in many directions.

11) Euclid described law of reflection in 300 BC. This states that light travels in straight lines and reflects from a surface at the same angle at which it hits it.

12) Image in plane mirror is reversed right to left and left to right which is 'lateral inversion'.

13) We see four characteristics of an image:
- magnification (size)
- type (virtual/real)
- attitude (upright/inverted)
- position (distance from ~~object~~ optical device)

14) In real image, rays first converge at a point and then diverge.

15) In virtual image, rays never converge.

16) Our eyes can see both real and virtual images, as long as diverging rays enter our pupils.

17) Mirrors produce virtual images.

18) Projectors of movies produce real images.

19) Characteristics of images in plane mirror are:
- magnitude (same size as the object)
- position (same distance as the object from mirror)
- attitude (always upright but laterally inverted)
- type (virtual)

20) Simplest periscope has two mirrors at 45°.

21) In a periscope, the longer and narrower the tube is, the smaller the field of view will be.

22) Quartz is a transparent medium.

23) Refraction occurs due to change in velocity of light.

24) Speed of light in water is less than the speed of light in air. but greater than in glass.

air > water > glass

25) When a light ray moves from a material of high speed (light medium) to a material of slow speed (dense medium), the ray bends towards normal e.g air to glass and vice versa.

26) If light and normal are parallel, no refraction occurs in either case.

27) Concave mirror converges all the beams coming parallel to principal axis and is known as converging mirror.

28) Convex mirror diverges all the beams coming parallel to principal axis and is diverging mirror.

29) When a plane mirror is moved away, only one characteristics of image changes: distance of image.

30) Concave mirror magnifies image when moving towards pole. Convex mirror reduces image.

31) For both concave & convex mirrors:

- ray parallel to principal axis reflects through the focal point.
- ray passing through focal point reflects back parallel to principal axis.
- a ray reflected on 'Pole' makes same angle with normal at which it hits.
- If a ray is passing through centre of curvature, it will reflect back along the same path.

32) For a concave mirror:

- When object is beyond C.
  magnification = small size position = between C & F
  attitude = inverted Type = real
- When object is at C.
  magnification = same size position = at C
  attitude = inverted type = real
- When object is between C & F
  magnification = large size position = beyond C
  attitude = inverted type = real
- When object is at F
  lines never converge or diverge, but become parallel and form highly enlarged image.
- When object is between F and P
  magnification = large size position = behind mirror
  attitude = upright type = virtual.

33) For a concave mirror, only cas when image is upright, virtual and appears behind the mirror is when object is between F and P.

34) For a convex mirror, reflected rays are always diverging, so we extend them at back of mirror to meet at a point. So in convex mirror, image is always behind mirror, upright and virtual. It always present between P and F and is smaller.

35) Convex mirror is used in passenger-side mirror of cars to get a wider view.

36) Concave mirror is used in shaving mirror to get a zoom-in image of face

37) A ray of light is incident towards a plane mirror at an angle of 30° with mirror surface (not with normal), angle of reflection is 60°.

38) Letter 'M' remains unchanged in plane mirror because its lateral inversion is also 'M'.

39) For concave mirror, no image is formed when object is at focal point.

40) To get an enlarge, upright image, concave mirror is used.

41) To get a reduced, upright image, convex mirror is used.

42) The small dental mirror used by dentists is a concave mirror.

U#10 Electricity and Magnetism

1) Time rate of flow of charge or electrons is electric current.
2) SI unit of charge is columb
3) SI unit of current is ampere = 1 C/s.
4) Voltage is the difference of electric potential (energy) between two points in a circuit.
5) The size of current (charge flow) depends upon the voltage.
6) SI unit of voltage is volt = 1 J/C.
7) In lightning flash, voltage is about 300 million volts and current is about 30,000 A.
8) At our homes, voltage is 230 volts and current is 20 A.

9) In lightning, air in vicinity is heated to a temperature of 20,000 °C which is about 3 times the temperature of Sun's surface.

10) Value of resistance R is obtained by dividing voltage V by current I. $\frac{V}{I} = R$.

11) Electric ~~current~~ conductors e.g gold, silver, copper, and aluminium have low resistance.

12) Electric insulators e.g plastic, glass, rubber, cloth have high resistance.

13) Resistance depends upon 4 things.

- type of material
- length of wire
- cross-sectional area
- temperature.

14) Devices that are designed to have a specific value of resistance are called resistors.

15) Resistors are made of special alloys or carbon.

16) Electric power is the rate at which electrical energy is used in a circuit. or the rate at which electrical work is done is called electric power.

17) Electric power is product of current and voltage.

18) SI unit of Electric power is watt = 1A×1V.

19) LED bulb has 12 W.

20) Hair dryer has 2000 W.

21) Circuit breaker restarts by pressing a button.

22) Earth has zero potential.

23) Earthing means to connect meta case or neutral part of the supply system to Earth by means of earth wire.

24) Earth pin on a three-pin plug connects the metal case to Earth by a path of almost zero resistance.

25) Electric shock occurs when when current flows from circuit through person body to Earth.

26) The strength of electric shock is determined by size of current (not voltage) and duration of time.

27) In 1820, Danish science teacher Hans Christian Oersted found that magnetism is produced by moving electric charges.

28) Increasing current and wrapping the wire into a coil creates strong magnetic field.

29) Magnetic field can also be increased by inserting a rod of iron (called core) Through the centre of core. The resulting device is called an electromagnet.

30) Electromagnets are used in electric cars and lifting magnetic materials, iron & steel.

31) In sound speakers, there is a permanent magnet and an electric magnet.

32) Increasing voltage will increase brightness of bulb.

33) Fuses melt if current exceeds.

34) Gold is conductor and silica is an isulator.

35) Purpose of resistor is to limit current.

36) Aluminium is very weak electromagnet material.

Unit#11 Technology in Everyday Life.

1) Elements required to make toothpaste are:
- Glycerin = 2 teaspoon
- baking soda = 3 teaspoon
- peppermint oil = 5 drops
- a pinch of salt.

2) When oil or fats are heated with an alkali NaOH, sodium salts of fatty acids (organic acids) are formed. These salts are called soaps. and this reaction is known as saponification.

3) Soap dissolves in water to form lather.

4) Soap by definition is fat and oil mixed with alkali.

5) Materials required to make soap are:
- coconut oil = 56g
- Olive oil = 28g
- Pure sodium hydroxide = 15g
- any essential oil
- distilled water = 30g.

6) Pure sodium hydroxide is also known as lye.

7) Milk contains protein, fats, carbohydrates, calcium and vitamin D.

8) Milk contains a protein called casein.

9) When milk is mixed with an acid, casein molecules combine to form long chain product called casein plastic. or milk plastic.

10) Milk plastic is used for making buttons, decorative buckles, beads, combs, brushes etc.

11) Materials required for milk plastic are:
- milk = 1 cup
- vinegar = 4 cups

12) Materials required to make detergents are:
- washing Soda = 2 cups
- baking soda = 2 cups
- borax = 2 cups
- essential oil = 2-3 drops

13) Concave mirror is used as solar cooker because it converges parallel lines onto focal point.

14) Voltmeter is used to measure how much electricity (voltage) is produced.

15) Wind turbines convert ~~mechanical~~ wind kinetic energy into electrical energy.

16) Early forms of windmill were used to crush grain and pump water

17) Modern wind turbine has around 8,000 different parts.

18) Wind energy in Pakistan makes up more than 6% of the total electricity production.

19) UPS uses battery to control interruption in power supply by changing direct current voltage in batteries into AC using an Inverter.

20) Inverter runs using AC.

21) In making soap, when lye is completely dissolved, the solution is left to cool to 100 °C.

U#12 Our Universe

1) Sun is part of 200 billion stars in Milky Way.

2) Light travels 10 trillion km in a year or. 9,500,000,000,000,000 meters.

3) Alpha Centauri is 4.5 light years away.

4) Most distant object from Earth is 32 billion light years away.

5) There are thought to be over 2 trillion galaxies in observable part of the Universe

6) Average galaxy contains 100 billion stars.
7) Local Group has about 40 galaxies.
8) There are three categories of galaxies:
- spiral galaxy
- elliptical galaxy
- irregular galaxy

9) Spiral galaxy is most common type.
10) Milky Way is a spiral galaxy.
11) Central bright region at the core of a galaxy is called "galactic bulge".
12) Elliptical galaxies are egg-shaped (ellipsodal).
13) Elliptical galaxies have no galactic bulge.
14) Most elliptical galaxies contain old stars.
15) Elliptical galaxies can have as few as a hundred million to as many as 100 trillion stars.
16) Diameter of Milky Way is 100,000 light years.
17) Thickness of arms of Milky Way is 2000 light years.
18) Central bulge of Milky Way is about 10,000 light years.
19) Our Sun is 26,000 light years away from the centre of Milky Way.
20) Andromeda is the largest galaxy in Local Group.
21) Andromeda will hit Milky Way in 5 billion years.
22) Sun was formed about 4.5 billion years ago.
23) Sun spent 30 million years to reach stability.
24) From birth, Sun's life span is about 10 billion years.
25) Nuclear reactions outside the core cause the dying star to expand outward in the "Red Giant" phase before its collapse.
26) After Red Giant phase, core of star ends up as:
- White Dwarf,
- Neutron Star or
- Black hole.

27) Neutron star is also known as a pulsar.

28) If initial mass of a star is less than or equal to Solar mass, red giant becomes a white dwarf.

29) White dwarf has size of an Earth.

30) Colour of white dwarf changes as:
white → yellow → red → black.

31) The black phase is called black dwarf.

32) Sun will become white dwarf in 5 billion years.

33) Current nearest known white dwarf is Sirius B located at 8·6 light years.

34) If initial mass of a star is between one to five times solar masses, the red giant becomes a neutron star.

35) One teaspoon of a neutron star would weigh about 10 million tons.

36) Diameter of a neutron star is estimated to be 10-20 kilometers.

37) A pulsar is a highly magnetized rotating neutron star that emits beams of electromagnetic radiations out of its magnetic poles.

38) Individual pulsars of a pulsar star may range from milliseconds to a few seconds.

39) If initial mass of a star is more than 5 times the mass of the Solar mass, the red giant becomes a black hole.

40) Supermassive blackhole at centre of Milky Way is about 4·3 million solar masses.

41) Birth of Sun took about 100 million years.
42) Andromeda is about 2.4 million light years away.
43) During Red Giant phase of Sun, its radius will be 30 times more than it is now.
44) Red Giant phase of Sun will last for about 2 billion years.
45) Telescopes make use of curved mirrors and glasses (lenses). to focus light from night sky.
46) Optical telescope captures only visible light,
47) Spectrum telescope makes use of radio waves, ultra violet, infra red, x-rays, gamma rays.
48) Hubble Space Telescope was launched in 1990.
49) Earth atmosphere blocks ultraviolet and X-rays.
50) James Webb Space Telescope is designed to study oldest and most distant stars and atmospheric details about planets other than solar system for potential habitability.
51) A space probe is a space vehicle without astronauts launched into space to explore universe.
52) Galilio was first space craft to orbit a planet (Jupiter) and give information. It also studied Jupiter's moons and rings.
53) Galilio was launched in October 1989, and it arrived close to Jupiter in December 1995.
54) Galilio was crashed into Jupiter in September 2003.
55) Voyager 1 is most distant travelling human made object

56) A galaxy with no or very little star formation is elliptical.

57) During star formation, the stars are prevented to collapse under gravity by nuclear reactions